

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference B14318.3 SL	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/FR2004/050396	International filing date (day/month/year) 27.08.2004	Priority date (day/month/year) 27.08.2003
International Patent Classification (IPC) or national classification and IPC B01J35/00, H01M4/92		
Applicant COMMISSARIAT A L'ENERGIE ATOMIQUE		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of <u>9</u> sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising: a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows: <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input checked="" type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language _____ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-47 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. 1-28 _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* _____ received by this Authority on _____
- nos.* _____ received by this Authority on _____
- ☒ the drawings:
- sheets 1/7-7/7 _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. IV Lack of unity of invention

1. ☐ In response to the invitation to restrict or pay additional fees the applicant has:
- ☐ restricted the claims.
 - ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ neither restricted the claims nor paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
- ☐ complied with.
 - ☒ not complied with for the following reasons:

The subject matter of independent claim 1 is already known (cf. the grounds for this objection). The requirement of unity of invention (PCT Rule 13.1) is therefore not fulfilled, in so far as no technical relationship involving one or more of the same or corresponding special technical features, within the meaning of PCT Rule 13.2, exists between the respective subject matter of the following groups of dependent claims: Group 1 - claims 1 to 23; Group 2 - claims 24 to 28.

4. Consequently, this report has been established in respect of the following parts of the international application:

- ☒ all parts.
- ☐ the parts relating to claims Nos. _____

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	10, 22-28	YES
	Claims	1-9, 11-21	NO
Inventive step (IS)	Claims	10, 24-28	YES
	Claims	1-9, 11-23	NO
Industrial applicability (IA)	Claims	1-28	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

1. In the present report, reference is made to the following documents:

- D1: FR 2 783 051 A (COMMISSARIAT ENERGIE ATOMIQUE) 10 March 2000 (2000-03-10);
- D2: ZAMBORINI F P, GROSS S M, MURRAY R W: "Synthesis, Characterization, Reactivity, and Electrochemistry of Palladium Monolayer Protected Clusters" LANGMUIR, vol. 17, 2001, pages 481-488, XP002276843;
- D3: TEMPLETON ET AL.: "Gateway Reactions to Diverse, Polyfunctional Monolayer-Protected Gold Clusters" J. AM. CHEM. SOC, vol. 120, 1998, pages 4845-4849, XP002276844;
- D4: PEREZ H, PRADEAU J-P, ALBOUY P-A, PEREZ-OMIL J: "Synthesis and Characterization of Functionalized Platinum Nanoparticles" CHEM. MATER., vol. 11, no. 12, 1999, pages 3460-3463, XP002276845;
- D5: US 6 391 818 B1 (FRANK GEORG ET AL) 21 May 2002 (2002-05-21);
- D6: WO 99/61911 A (HOSTETLER MICHAEL J; TEMPLETON ALLEN C (US); UNIV NORTH CAROLINA ()) 2 December 1999 (1999-12-02);
- D7: BRUST M ET AL.: "Synthesis and Reactions of Functionalised Gold Nanoparticles" J. CHEM. SOC, CHEMICAL COMMUNICATIONS, no. 16, 1995, pages 1655-1656, XP008029751.

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2.	<p>INDEPENDENT CLAIM 1</p> <p>2.1.1 D6 describes (the references between parentheses apply to said document) the use of nanoparticles including a metal core from group VIIA, IB or IIB (claim 3), a first organic coating consisting of molecules bound to the surface of the metal core, and a second organic coating consisting of molecules that differ from the molecules of the first organic coating (for example "10H-(phenothiazine-10)propionic acid") and are grafted onto molecules of the first organic coating, as catalysts (claim 18), wherein the metal core can specifically contain platinum or palladium (see page 6, lines 177-180).</p> <p>2.1.2 Although it is well established that a prior art document comprising two lists of variables does not constitute a disclosure of a specific combination of said variables, nothing of the like is to be found in D6.</p> <p>D6 describes (see page 6, lines 173 to 180) nanoparticles of which the core includes a metal or a metal alloy, which is preferably selected from among semiconductor materials, metal oxides, the elements of group VIIIA, the elements of group Ib, the elements of group IIB, and the alloys and mixtures thereof.</p> <p><u>More preferably</u>, the metal or alloy is selected from among the elements of group VIIIA, the elements of group Ib, and the alloys and mixtures thereof.</p> <p><u>Specific examples</u> are gold, silver, copper, palladium, platinum, nickel and alloys thereof.</p> <p>The use of the platinoids palladium and platinum is considered to be explicitly disclosed (was made accessible to the public) because it is one of the specific examples of a preferred embodiment.</p> <p>The use as a catalyst is explicitly disclosed in a</p>

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dependent claim (claim 18 of D6).

2.1.3 The subject matter of claim 1 is therefore not novel over D6 (PCT Article 33(2)).

2.1.4 It is also noted that the selection of platinoids from the list of gold, silver, copper, palladium, platinum and nickel can be considered inventive only if the combination produces unexpected effects or has unexpected properties relative to those of catalytic methods in general. However, no such effect or tangible property is disclosed in the application. Consequently, the subject matter of claim 1 cannot involve an inventive step.

2.2 D5 describes (the references between parentheses apply to said document) fuel cell catalysts including nanoparticles having a metal core containing platinum and an organic coating degradable by hydrolysis, including polymeric betaines (claim 22). These nanoparticles contain a polymer that includes, alongside the monomers having betaine groups, other monomers (claim 7). Said polymeric coating can thus also be considered to be the molecules of the first and second coating.

In D5, the nanoparticles are coated ("embedded") in a protective colloid, but it appears that the molecules forming the protective colloid are not bound to the surface of the metal core, within the meaning of the present application.

3. INDEPENDENT CLAIM 22

3.1 D5 describes (the references between parentheses apply to said document) fuel cell catalysts including nanoparticles having a metal core containing platinum and an organic coating degradable by hydrolysis, including polymeric betaines (claim 22). These nanoparticles contain a polymer

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that includes, alongside the monomers having betaine groups, other monomers (claim 7). Said polymeric coating can thus also be considered to be the molecules of the first and second coating.

In D5, the nanoparticles are coated ("embedded") in a protective colloid, but it appears that the molecules forming the protective colloid are not bound to the surface of the metal core, within the meaning of the present application.

This difference appears to be a routine technical step for a person skilled in the art.

In the absence of any element in the description demonstrating that a technical effect or a tangible property has been obtained by this difference, an inventive step cannot be acknowledged for the subject matter of claims 22 and 23.

4. INDEPENDENT CLAIM 24

D1, which is considered to be the prior art closest to the subject matter of claim 24, describes (claims 11, 17, 18 and examples 1 to 4) a nanoparticle including a metal core containing at least one platinoid, a first organic coating consisting of molecules bound to the surface of the metal core, and a second organic coating consisting of molecules that differ from the molecules of the first organic coating, and are grafted onto molecules of the first organic coating.

Consequently, the subject matter of claim 24 differs from this known nanoparticle in that the molecules of the second organic coating are groups of a compound selected from the mono- and polycyclic anhydrides.

The subject matter of claim 24 is therefore novel (PCT Article 33(2)).

The problem that the present invention is intended to solve

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	<p>can be considered to be that of providing nanoparticles having electrocatalytic properties, having very satisfactory properties of dispersibility, stability in a liquid medium, resistance to highly acidic or highly alkaline media with strong ionic forces, conventionally used in the field of electrochemistry (see page 7 of the application).</p> <p>The solution to this problem, as proposed in claim 24 of the present application, is considered to involve an inventive step (PCT Article 33(3)).</p> <p>Claims 25 to 28 are dependent on claim 24 and thus also comply, as such, with the PCT requirements of novelty and inventive step.</p> <p>5. DEPENDENT CLAIMS 2 to 21</p> <p>5.1 In the light of D1 to D6 (in particular D6), dependent claims 2 to 9 and 11 to 21 contain no feature which, when combined with the features of any one of the claims to which they refer, defines subject matter that complies with the PCT requirements of novelty and/or inventive step.</p> <p>5.2 The technical features of claim 10 are not known and involve the technical effect already mentioned in point 4 above. Claim 10 thus also meets the PCT requirements of novelty and inventive step.</p>

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The method of binding the molecules of the first coating, as mentioned in page 9, lines 3 to 7 ("by a strong chemical bond"), differentiates the subject matter of claim 1 from the known prior art D5. It is therefore an essential element of the invention that should be incorporated in independent claim 1.